NavMed 369

UNITED STATES NAVY

MEDICAL NEWS LETTER

Rear Admiral Bartholomew W. Hogan MC USN - Surgeon General
Captain Leslie B. Marshall MC USN (RET) - Editor

Vol. 32 Friday, 19 September 1958 No. 6

TABLE OF CONTENTS

Hazards of Scuba Diving

The industrial physician now must add at least a rule-of-thumb knowledge of diving medicine to his lists of talents. Since the development of barometric compensated demand valves for increased pressures, the practice of diving with self-contained equipment has spread all over the world, but nowhere has it caught the public fancy as in the United States. Diving is no longer only a sport of the tropical seashore. The diving equipment has been proved useful for many kinds of underwater work, not the least of which is geological searching.

If for no other reason than that the company recreation association may be sponsoring an aquatic sports club, the industrial physician has a need to know.

First of all, one must distinguish between the skin diver—who is just that, a swimmer who dives—and the diver. It matters not that the skin diver wears foot fins to aid his swimming, goggles or face mask (preferably the latter) to give him better underwater vision or uses a snorkel (breathing tube). He is a swimmer and can stay submerged only so long as he can hold his breath. He is subject chiefly to the hazards of swimming.

Before investing money in any diving outfit, the individual should consider the matter of physical fitness to dive. Diving is not a form of hydrotherapy in the usual sense of that term. It is hard work—much more strenuous than walking. While the surface swimmer is able to adjust his energy expended to a comfortable level, this is not true for the diver. Under water, even the exertion of breathing is considerable. This is due to the resistance of the valves and the airways, and the increased density of the air. In addition, there is the exertion of swimming. No hard and fast rule can be laid down, but it seems reasonable that a person with active disease of the pulmonary or cardiovascular systems should not engage in any strenuous sport, including this one. Air travelers know thay may encounter difficulty in equalizing pressure in the ears and sinuses with changes in altitude. These same individuals often do not realize that the relative pressure differential produced by altitude changes of hundreds of feet may be produced by a foot or two difference in underwater depth. Certainly, those who do not have the ability to equalize pressure in their ears and sinuses would do well to find another sport. Chronic ear infections are not likely to improve. Perforated ear drums invite infection with possible disastrous results on hearing ability. Aside from the liability of flare-ups of infection, there is the more immediate danger of extreme dizziness caused by water entering the ear and producing the reaction of the caloric test of vestibular function. The dizziness is bad enough, but when accompanied by nausea, it may produce an underwater situation ending fatally.

In addition to the considerations of physical fitness, there is the matter of self-confidence in the water. This is more than being a good swimmer,

although that is highly desirable. The underwater world is fascinating, but it is, for man, an unnatural and hostile environment. Emergencies and surprises can, and do, arise frequently in this sport. Life or death hangs in the balance for the moment. Nothing else means so much in that instant as calm deliberate evaluation of the situation based on self-confidence. This composure is not gained hastily nor by chance. Sport diving is not for those who are novices at water sports nor for the physically soft or unsound.

The sportsman diver uses some form of self-contained underwater breathing apparatus (abbreviated to "scuba" for convenience) which supplies him with a breathing medium from a compressed supply carried in a flask. This is an appropriate place to condemn any misguided and dangerous attempt to use under water a rescue breathing or smoke type apparatus having a demand valve. The demand valves of this type of equipment simply are not expected to operate adequately under the increased ambient pressures encountered in diving; not even at relatively shallow depths. This is the chief objection to the use of demand valves salvaged from aviator's oxygen equipment. Do not use anything but equipment designed for this purpose and backed by the good name of a reputable manufacturer.

Another basic rule of diving safety is, never use oxygen as a breathing medium. About a year ago, a letter was received from a physician in the Middle West asking what chemical was used in a diving outfit to absorb carbon dioxide. Being aware that physicians often make mistakes because of being partly informed, this inquiry aroused the suspicion that this doctor was making an oxygen, closed-circuit type scuba in the belief that a small flask of oxygen could be used safely to extend his submerged time. There is such equipment used by experts for special military missions. Their use can be reasonably safe in the hands of especially indoctrinated, experienced divers, but they are never used by choice, only out of necessity. They clearly are not for the sportsman diver.

A cautious answer was composed for the doctor. It was suggested that a canister design for diving equipment is not the same as for gas masks, that moisture can ruin the effectiveness of the carbon dioxide absorbent, that failure of the absorbent can result in "shallow water black-out" (presumably carbon dioxide toxicity) and unconsciousness leading to drowning. And, if none of these happened, he could always worry about oxygen convulsions. The Navy tests candidates for diver school by having them breathe oxygen from a mask for 30 minutes while at a pressure equivalent to being 60 feet deep in the water. An appreciable number fail this test. Astonishingly few physicians seem to have heard of this convulsant effect of oxygen. This rule is worth repeating—never use an oxygen outfit.

Now the confident swimmer is equipped with a well designed, open circuit, air-supplied, self-contained underwater breathing apparatus. The open circuit type is specified because this eliminates the carbon dioxide absorbent canister required in closed circuits and removes the hazard of failure of

this unit. This equipment is not cheap. It deserves good care and maintenance. The diver should learn to service and maintain his own equipment.

The proper care of such equipment can be learned in part by reading the literature supplied with the equipment. However, nothing written in sales promotion pamphlets equals the lessons that can be imparted by one who has learned by an experience he has survived. For this reason, the novice sport diver should join an organized diving club. It would be wise to affiliate with a club associated with an organization known to have a sound, conservative water-sport program rather than with a collection of "aquatic hot-rodders." Although not an infallible test, those clubs having grown past adolescence in this sport, recognize that the setting of diving records is a temptation to foolhardiness. Novices should avoid such groups for their own safety and the sake of the sport's good reputation. A good club will sponsor activities for divers at various levels of proficiency. Because this is something new, as it was to all the others at some time, there should be no reluctance in lining up with the beginners. Training programs must be adjusted to the time, place, and facilities available. But sometime in the course of any good training program there are certain things that will be heard over and over. Among them are:

Don't dive alone. Underwater emergencies can arise when least expected from failure of equipment, from illness of the diver, from underwater hazards—living things or mechanical things. One diving buddy can look out for the other.

Use a buddy-line. Whenever diving at night or in conditions of poor visibility, a diver can find his buddy if they are tied to each other. CDR Douglas Fane, the daring leader of underwater demolition teams wrote on a casualty report, "Another life saved by the buddy system." This endorsement should be testimony enough for anyone.

Don't try to set records. The world's deepest diver was last seen going down. The object is to come back, not to see how deep one can go.

Easy does it. After all, it is a sport. Exhaustion is the door to disaster. A tired man does not think well. All people do not swim equally well nor have the same endurance. A less able swimmer can exhaust himself trying to keep up with a more able buddy and once exhausted he is easy prey in an emergency. He may not only lose his own life, but also may cause his buddy to lose his in rescue efforts. Take turns at being the leader so each diver frequently has a chance to set the pace.

Never forget to exhale when coming up. This fundamental rule has to do with Boyle's Law of the behavior of gases. At constant temperature, the volume of a given mass of gas varies inversely as the absolute pressure exerted on it. A diver 33 feet deep in the water (two atmospheres absolute pressure) whose chest is filled with air would, if he held his breath, have two chest fulls when he reached the surface (one atmosphere

absolute). Obviously, his ribs keep his lungs from expanding to double their size so the pressure is not equal inside the lungs and outside the body. This pressure gradient is exerted across the alveolar membrane. A pressure gradient such as this can force air out of the alveoli, into the interstitial tissues (emphysema) and even into the vascular tree (air embolism). Fatal air embolism has been known to occur from quite shallow depths (10-15 feet). While emphysema may be only bothersome and distressing, air embolism is an immediate critical emergency. The only adequate treatment when air embolism causes unconsciousness is recompression to a depth sufficient for treatment (165 feet). Unfortunately, facilities for recompression are expensive and require knowledgeable operators. Very few civilian owned recompression facilities exist. The Navy has such facilities distributed along the sea coasts to meet its needs.

Sport divers who do not set out to establish records are not ordinarily liable to encounter problems of decompression sickness unless they dive deep, stay down for long periods, or what is more often the mistake, make several dives in a day. The sport is so fascinating it creates a strong temptation to go deeper and stay longer. The manufacturers of the better known equipment have tried to avoid this problem by controlling the size of the compressed air flask. However, popular demand has created a market for outfits with more than one flask. There is only one way to avoid this problem and that is to never exceed the no-compression schedule according to the Table accompanying this article. One dive a day made within these limits is relatively safe.

No Decompression Dive Schedules*

Deepest Depth of Dive in Feet	"Bottom Time"** in minutes
35	310
40	200
50	100
60	60
70	50
80	40
90	30
100	25
110	20
120	15
130	10
140	10
150	5
160	5

* The foregoing schedule, based on experimental data collected by the U. S. Navy Experimental Diving Unit, Washington D. C., will appear in a revision of the Navy Diving Manual now in preparation. It is based on a rate of ascent of 60 feet per minute.

** "Bottom time" commences when the diver leaves the surface and ends when he leaves the bottom to ascend directly to the surface.

(Harry J. Alvis CAPT MC USN, Hazards of Diving with Self-Contained Underwater Breathing Apparatus: Indust. Med., 27: 389-391, August 1958)

* * * * * *

Bagassosis

Bagasse is the fibrous material remaining after the sugar-containing juice has been expressed from sugar cane. The word was first applied in France to the refuse from olive oil mills.

Bagassosis, or bagasse disease of the lungs, is a disorder resulting from the inhalation of bagasse dust. Typically, it is an acute pneumonitis or bronchiolitis which is often associated with roentgenographic features resembling miliary tuberculosis. Dyspnea is the most characteristic symptom, although cough, hemoptysis, fever, weakness, and weight loss are often present. Complete recovery usually takes place after a few weeks or months.

In spite of the fact that bagassosis is unquestionably caused by the inhalation of bagasse dust, the specific physiopathological mechanism involved in the relationship has never been clearly defined. The disease has been variously attributed to a specific irritant property of the bagasse fiber itself, to its silica content, to allergy, to microorganisms present in the dust, and to all combinations of these factors.

From the discussion, it is obvious that many factors may be involved in the etiology of bagassosis; at present none of the proposed mechanisms seem to satisfy all objections. Further studies are needed with particular attention directed toward the role of microorganisms of ordinarily low virulence. Additional pathological information would be highly desirable and might help to clarify the puzzling etiology of this disease, but it seems likely that appropriate materials will be difficult to obtain.

The occupations associated with exposure to bagasse dust are those involving heavy manual labor. This accounts for the occurrence of the disease almost exclusively in men 20 to 45 years of age. No racial differences have been observed. Working conditions favorable to the contraction of the disease include a dusty atmosphere, usually in a poorly ventilated space, and almost invariable contact with dry bagasse.

A review of the reported cases of bagassosis immediately impresses one with the consistency of the clinical picture. In most instances, after

exposure to the dust for periods of a few weeks to a few months, symptoms appear over a space of several days. Cough, exertional dyspnea, and slight fever are usually the initial complaints. Hemoptysis of a mild degree is rather common, but frank pulmonary hemorrhage is rare, if it occurs at all.

As the disease progresses, dyspnea usually dominates the clinical picture and soon becomes incapacitating. Cyanosis may appear in more severe cases. Weakness is often prominent and may be associated with anorexia and loss of weight. These latter symptoms sometimes antedate all others and the amount of weight lost is at times impressive.

Fever is usually slight to moderate, but temperature elevations as high as 104° F. are observed in the more severe cases. Other symptoms may include night sweats, chilly sensations, and retrosternal pain. True chills are less common. Pleuritic pain is absent.

Physical examination may reveal little more than various degrees of dyspnea and, possibly, cyanosis. The pulse rate is elevated in proportion to the temperature. Diffuse or localized crepitant rales can usually be heard over the lung fields and the second pulmonic heart sound may be accentuated. A slight or moderate blood leukocytosis is usually present, but eosinophilia is not observed.

The vast majority of patients tend to improve spontaneously when they are removed from contact with the offending agent. Symptoms gradually abate in a few weeks and complete recovery usually takes place in 1 to 6 months, although in some cases the patient may not feel entirely well for a year or more. The abnormal x-ray findings gradually resolve and, as a rule, no trace of the disease remains after 2 to 6 months, but some impairment of pulmonary function may be detected for longer periods.

Four of the fifty-three patients reported in the literature have died of bagassosis, representing a mortality rate of about 7.5%. However, this figure is probably not a true one and should be much lower because many milder cases of the disease have undoubtedly escaped medical attention.

The diagnosis of bagassosis is based on the occupational history, the characteristic clinical and roentgenographic picture, the usual benign course, and the exclusion of other disorders. Miliary tuberculosis offers the chief problem in differential diagnosis. However, any of the vast group of diseases which may be associated with miliary lesions in the lung must be considered and excluded. (Buechner, H.A., et al., Bagassosis - A Review with Further Historical Data, Studies of Pulmonary Function, and Results of Adrenal Steroid Therapy: Am. J. Med., XXV: 234-245, August 1958)

* * * * * *

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget 19 June 1958.

* * * * * *

Treatment of Parenchymal Tuberculosis

This study concerns the exploration of an entirely new approach in the chemotherapy of parenchymal tuberculosis: the endobronchial route. This concept is relatively new and few references are to be found in the literature. Before going into the details of its clinical aspects, certain basic anatomico-physiological as well as pathological phases of the fate of particulate matter within the lung are outlined. Special reference is made to the tubercle bacillus as well as the antituberculosis characteristics of several drugs for a better understanding of the rationale of this type of therapy.

Studies of the fate of particulate substances, including the tubercle bacillus introduced into the respiratory channels, show a definite reaction on the part of the host to such invasion. The portion of this matter not immediately removed by cough penetrates the air passages and is carried to their finest subdivisions where it is subjected to reactions brought about by the protective forces indigenous to normal tissues. Phagocytosis is the first to function, but is limited to particles less than 10 microns in size. The larger particles are not engulfed; they are promptly removed through the airways by the usual excretory function of entrapment in mucous secretions, ciliary motion, molding by the spiral bronchial musculature, and the expellent force of cough. Three cells—the polymorphonuclear leukocyte, the mononuclear alveolar cell, and the mononuclear cell which is believed to come from the blood—are the phagocytes concerned in removing particulate matter from the parenchyma; this is done by way of the lymphatics. One mechanism is by way of the superficial lymphatics which follow the first radicle of the pulmonary vein from the center of the primary lobule to its periphery and then course outward to join the subpleural plexus which in turn unite to form the lymph vessels that empty into the hilar nodes. The second is by way of the deep lymphatics which follow the bronchial and vascular channels towards the hilar lymph nodes. Still a third method of excretion through the alveolar ducts, bronchioles, and bronchi exists, but does not concern this study because it is noncontributory to the concentration of the drug in the parenchyma or lymphatics.

These observations would indicate that the introduction of particulate matter of antituberculosis activity directly into the bronchi would follow the same route taken by the tubercle bacillus and thus introduce bacteriostatic or bacteriocidal agents directly into foci usually involved by tuberculous infections. With such a portal of entry, several advantages are obvious: (1) a high focal concentration of the drug may be possible which would remain in the lobe for an indefinite period (oily suspension); (2) phagocytes loaded with engulfed drug particles are made bearers of the noxious agent to the tuberculous foci proper and, with their death, release a therapeutic bomb; (3) bacilli-laden phagocytes will transport only nonviable bacilli to new foci because INH—unlike SM—readily penetrates cell membranes in effective bacteriostatic or bacteriocidal concentration.

The patients studied in this series were not selected, but were treated in sequence as they appeared. All were ambulatory and only the more severely ill were confined to bed until the acute symptoms had subsided; but in no case for longer than 2 weeks. They are classified on the basis of x-ray findings and the severity of this involvement. All but two were on concomitant oral INH with conventional dosages. Two pregnancies, two diabetics, and one far-advanced unilateral bronchiectasis were the nontuberculous associated findings in the series. Two had complicating pleural effusion. In addition, two had persistent cavities with pneumothorax failure. One had tuberculous bronchostenosis of the left side with a destroyed lung. Two were postsurgical positives—one a lobectomy with exudative spread and the other an ivalon sponge plombage. The others ranged from acute exudative to the chronic fibrocaseous and fibroid types, although in some these phases were combined. Many cavities were encountered in the series—some single and others multiple in the same patient.

From their observations, the authors believe that the endobronchial therapy for pulmonary tuberculosis is indeed specific and apparently independent in its action from any effect of oral therapy.

The rapid disappearance of fluid in the two cases of effusion complicating the pulmonary lesions would indicate that this treatment is also effective against tuberculous effusions. Bronchoscopic observations with respect to secretions show that these are considerably reduced in quantity and modified in character following INH instillation, and in many of the patients stopped completely within a short interval. Papanicolaou smears showed a rapid disappearance of the leukocytes with reversion to a normal cytogram.

Dosage schedules, because of the pilot nature of this study, were more or less arbitrary and instillations were generally repeated when it was considered that an additional instillation would further effect the regression of the lesion. For the same reason, accurate spacing could not be determined because the time intervals of effective change and quantitative response of the lesion were unknown factors. In general, it would now seem that from one to four instillations are necessary for maximum therapeutic effect spaced at 20-day intervals. This arrangement, however, is a mere guide and if the lesions persist or recur a second instillation is in order at any particular time.

The amount of the suspension used was generally 10 cc. per lobe and for these purposes the lingular division is considered as a separate lobe. Multiple instillations, when indicated, are made at the same time. With the five-lobe bronchographic technique, as much as 25-30 cc. of the radiopaque suspension may be used.

Resistance of the tubercle bacillus as judged clinically has not been a factor in this study when using the endobronchial instillation, although it may be expected when the scope of this technique is enlarged to a greater number of cases. (Carabelli, A. A., The Endoscopic Treatment of Parenchymal Tuberculosis, A Pilot Study in the Human: Dis. Chest., XXXIV: 163-178, Aug. 1958)

Diagnostic Criteria of Congenital Hypothyroidism

It seems clearly evident that the earlier the diagnosis of congenital hypothyroidism is established and adequate therapy is begun, the more satisfactory is the prognosis. In a series of 49 cretinous patients seen at the University Hospital (University of Michigan), the average age at the time of diagnosis was 12 months. The authors believe that in most of these cases a diagnosis could have been made before 6 months of age. A survey of these patients revealed that 54% had at least three prominent symptoms of their disease by the end of the first month of life and 75% by the end of the third month. At present, there are generally available laboratory studies that can confirm a suspicion of congenital hypothyroidism in better than 90% of cases. Most of the pediatric textbooks and more extensive reference works pay little attention to the early time of appearance of the several important—although nonspecific—symptoms and, in describing the typical cretin, fail to emphasize that many of the classical physical findings are relatively late in onset. The present detailed study was made in an attempt to define more precisely criteria that will lead to an earlier recognition of the condition.

All of the 49 patients included in this survey have been followed in the University Hospital from 1 to over 30 years. Thirty-one of the patients were seen by the authors within the past year as part of a study which included a carefully obtained interval history in addition to a reevaluation of the original history. Both parents, when alive, were interviewed. A genetic evaluation was done by a member of the Department of Human Genetics of the University Medical School. Psychometric tests were obtained on all of the patients and constitute a portion of another report. Special studies were carried out in most family groups, including: protein-bound iodine determinations, radioactive iodine uptake by the thyroid at 1, 2, and 24 hours, paper chromatography of serum butanol-extractable iodine compounds, serum cholesterol determinations, and determinations of basal metabolic rate in the parents and older children.

The hospital records of the 18 patients who were not seen as a part of the special study were reviewed and a detailed questionnaire was sent to the families.

The age range of the patients at the time of preparation of this report was from 12 months to 32 years. All were of the white race, 37 infants were born in Michigan, 3 were born outside of Michigan, and the place of birth of 9 patients was not known.

The findings in this group of 49 cretins studied at the University Hospital are presented in an attempt to find as many criteria as possible that will lead to the earliest diagnosis. An analysis of the data leads to the following conclusions:

Important signs of cretinism become apparent by the third month in a high percentage of these infants. The most commonly observed findings in

order of frequency are: lethargy, constipation, feeding problems (including slow feeding), choking, failure to gain weight, and lack of interest; respiratory difficulties, umbilical hernia, and skin changes. Three or more of these were present in over 50% of the patients by the end of the first month and in 75% by the end of the third month. The classical picture of the myxedematous cretin does not emerge until later.

The cause for delay in diagnosis is difficult to ascertain, but the authors believe that two of the most important factors can be attributed to the physician. He may wait for the "full-blown" development of cretinism to be sure of his diagnosis; he may have had the misconception that the time of diagnosis makes relatively little difference in the ultimate prognosis. There is enough evidence available at present to prove that this is a grave error.

The incidence of thyroid disease in the families of cretins is greater than in the general population. The occurrence of more than one sibling with congenital hypothyroidism is not uncommon. It occurred in 9% of families in the present series.

The course of pregnancy and labor resulting in a congenitally hypothyroid infant is not remarkable in most instances. There is no characteristic birth order in congenital hypothyroidism.

Seventy-five percent of the congenitally hypothyroid children in this series were of the athyroid type. Eight percent were born with, or developed, goiters in infancy or early childhood. An error in the synthesis of the hormone was proven in all but one of the goitrous patients and was probably present in the one exception, but tests could not be completed.

The estimation of the serum protein-bound iodine or butanol extractable iodine is the most valuable laboratory test to establish diagnosis because of its reliability and the fact that exposure to radioactivity is avoided. This last factor is the only serious limitation to the use of I^{131} uptake by the thyroid which is an equally reliable diagnostic procedure. In goitrous patients, and possibly in a small number without goiter formation caused by errors in synthesis of the thyroid hormone, laboratory determinations in addition to those of protein-bound iodine and I^{131} uptake may be necessary to establish a definite diagnosis. The more exact identification of iodinated compounds in the blood is then required.

The evaluation of bone maturation is a valuable screening device. Every patient adequately examined by x-ray for "bone age" had easily measured retardation. Without the finding of delay in appearance of ossification centers, one can strongly doubt the diagnosis of hypothyroidism.

The authors believe that the therapeutic trial of thyroid in infants and children as a means of diagnosis is no longer a desirable procedure.

Diagnosis of cretinism usually can be made by 3 months and certainly before 6 months of age with the aid of careful history, adequate physical examination, and a very few laboratory procedures. (Lowrey, G. H., et al.,

Early Diagnostic Criteria of Congenital Hypothyroidism - A Comprehensive Study of Forty-Nine Cretins: J. Dis. Chil., 96: 131-142, August 1958)

* * * * * *

Generalized Cytomegalic Inclusion Disease

Generalized cytomegalic inclusion disease is systemic, primarily of infancy, and characterized by the presence of intranuclear and intra cytoplasmic inclusion bodies in enlarged cells of a variety of viscera. It has also been known as generalized salivary gland virus disease, inclusion disease, and protozoan cell disease. In 1921, Goodpasture and Talbot recognized the abnormal cells as altered tissue cells rather than protozoan organisms and referred to the changes as "cytomegalia." Apparently, identical cells have been encountered incidentally in 10 to 32% of salivary glands, and in other organs in 1 to 2% of routine infant autopsies. In certain cases, however, a specific salivary gland virus infection exists which probably originates in utero and may or may not end fatally.

Cytomegalic inclusion disease may be divided into four main categories: (1) the subclinical variety found in submaxillary glands and other organs at autopsy of stillborn or newborn infants dying of other causes; (2) poorly understood cases occurring apparently in association with other diseases, such as pertussis; (3) postulated cases with mild manifestations and recovery; and (4) the systemic or generalized variety which is usually lethal.

In children under 2 months of age, the condition is usually primary and fatal. In older children, it may be primary, but more often is associated with another disease and plays a minor role. It has been reported in an elderly female with vitamin A deficiency and malnutrition, in an adult male with leukemia who had received an antifolic acid drug which is known to affect cellular metabolism, and in guinea pigs after 3 weeks of aminopterin therapy.

The clinical picture is extremely varied and depends on the degree and site of involvement as well as the resistance of the host. The usual manifestation is a hematologic disturbance or jaundice in the newborn infant, full-term or premature. Thrombocytopenia may occur with accompanying petechial hemorrhage and the anemia may be hemolytic. Hemorrhagic manifestations may take the form of purpura, hematuria, melena, hematemesis, or cerebral hemorrhage. Hepatosplenomegaly is often present, but usually not marked, and there may be respiratory symptoms suggesting pneumonia. Macrocephaly, microcephaly, convulsions, and intracranial calcification have been reported. Chorioretinitis has recently been described.

Antemortem diagnosis of cytomegalic inclusion disease is made most readily by demonstration of inclusion cells in the urinary sediment and rarely from other epithelial surfaces. Roentgen findings of interest are seen in the group manifesting the disease at birth who are clearly victims of salivary

gland virus infection alone. Visible calcification outlining dilated lateral ventricles, when it occurs, is probably pathognomonic.

Changes in the lungs, when present, have not followed a consistent pattern. Interstitial pneumonia is usually described pathologically, but many cases, especially in the neonatal group, show no roentgen abnormalities.

Although salivary gland infection is poorly understood in many situations, the neonatal primary form, so-called generalized cytomegalic inclusion disease, has emerged as a clear entity.

The disease is probably acquired transplacentally and may involve a few or almost all organ systems. Brain involvement frequently is manifested by calcification around the lateral ventricles which, if present, is virtually diagnostic. Signs of brain atrophy are also commonly seen.

Marked diffuse bony sclerosis may be demonstrable at birth with atrophic changes becoming apparent in later months. These are probably nonspecific findings. (Allen, J.H., Riley, H.D. Jr., Generalized Cytomegalic Inclusion Disease with Emphasis on Roentgen Diagnosis: Radiology, 71: 257-261, August 1958)

* * * * * *

Late Local Recurrent Carcinoma of the Breast

This article is a report on a group of patients who had carcinoma of the breast treated by radical mastectomy and who then had local recurrence 5 or more years after the initial operation. An effort is made to answer the following questions: What is the cause of local recurrence? Why did this group of patients survive 5 or more years before the carcinoma recurred when, in the great majority of patients, it recurs at a much earlier date? How long do patients live after late local recurrence?

At the Mayo Clinic, in the years 1945 through 1954, there were 202 cases of locally recurrent carcinoma of the breast following radical mastectomy. All of these patients were operated on at the Clinic and in all cases the original tissue was reviewed and the pathologic diagnosis of carcinoma of the breast was verified. The recurrent lesion developed within 5 years of the time of the primary operation in 157 cases (78%), and after 5 years in the other 45 cases (22%); in ten of the latter cases, the recurrent lesions developed more than 10 years after operation. The group of 45 cases comprises the material of this investigation.

All 45 patients were women whose ages ranged from 35 to 72 years. Nowhere in the study was there evidence to indicate the possible influence of early diagnosis; all the primary tumors were not detected at an early date. On an average, the primary tumors were not small, nor were symptoms of unusually short duration. In fact, only 23 patients had clinical

symptoms for a period shorter than 6 months. The distribution of tumors with respect to grade (Broder's method) was about the same as that of a group of ordinary, run-of-the-mill carcinomas of the breast. Approximately half of the patients had axillary metastasis. Twenty-five of the primary tumors involved the lateral half of the breast, 12 involved the medial half, and 8 were centrally located. However, the lateral tumors were associated with axillary metastasis in 44%, while the medial and central tumors were associated with such metastasis in 55%. This would seem to imply that the medial tumors were of a slightly more progressive nature. Eight of the 20 medial and central tumors clinically were fixed to the skin in some degree, while 14 of the 25 lateral tumors were judged clinically to have involved the skin and they grossly appeared to be as far advanced as the medial tumors. Of a total of 22 patients who had axillary metastasis, only 13 had some skin fixation. In approximately half of the series, there was clinical evidence of skin fixation by the primary tumor.

The most common form of local recurrence was that of a skin nodule located medial to the scar near the sternum. This was true for the tumors located in the lateral half of the breast as well as for those located in the medial half or centrally.

The survival period after local recurrence was known in 24 of the 45 cases studied. The average survival period was approximately 2 years with a range of 3 months to 6 years. However, only three patients survived longer than 2 and 1/2 years. The average survival periods for patients following a local recurrence at 6 years was the same as for those who had a local recurrence at 8, 10, 12, 14, or 16 years (2 years $\pm$ 3 months).

The authors' data on size, grade, and clinical duration of primary tumors of the breast closely approximate the average data reported in the literature. Any relationship between the grade, size, or clinical duration of the primary tumors and the time of local recurrence was not demonstrated. Also, there was no evidence to indicate that late recurrences are possibly due to an early diagnosis; clinically, 49% of the primary lesions of the breast were judged to be fixed to the skin to some extent. This suggests that local involvement of the skin by the primary tumor was not related to the time of recurrence.

It is clear that the lymphatic drainage of the breast is in intimate relation with that of the overlying skin. Because the incidence of metastasis to the axillary nodes is extremely high in patients in whom recurrent lesions develop in the skin, it seems probable that retrograde embolization and retrograde permeation from residual carcinoma in the lymphatic system are frequently responsible for local recurrences.

In the light of more recent studies on internal mammary nodal metastasis from carcinoma of the breast, the authors believe it reasonable to postulate that at least half of the medial and central lesions in this series were associated with internal mammary nodal metastasis. If such be true,

then parasternal recurrences may be due to direct extension or retrograde permeation from involved lymph nodes in this important region. Fifty-three percent of the parasternal recurrences were associated with lack of evident metastasis to axillary nodes. This suggests the possibility that mediastinal metastasis occurred at the same time as, or prior to, metastasis to the axillary nodes.

Recurrence along the margin of the scar would seem to suggest that not enough skin had been removed. The percentage of patients living 5 years or more and the reported incidence of local recurrence are unaffected by the type of operation. Most surgeons consider primary closure preferable to skin grafting, especially as it does the patient no harm. All incisions in this series were closed by the plastic technique. The incidence of local recurrence within or adjacent to the scar was not unduly high (20%). Conway and Neumann, using the Halsted-Thiersch graft procedure, found that 67.5% of their local recurrences were in the immediate vicinity of their skin grafts, 15% were within the graft, and 17.5% took the form of innumerable foci widely scattered over the thoracic wall. They concluded that it probably never will be possible to avoid local recurrence as is evident by the fact that 32.5% of the recurrences appeared within the grafted area or as widespread foci.

The present study and those of others indicate that survival after clinical recurrence is usually poor and bears no relation to the length of the cancer-free period before recurrence. A factor of individual host resistance seems probable; decompensation of host resistance is followed by accelerated growth of the neoplasm, metastasis, and death. (Pawlias, K. T., Dockerty, M. B., Ellis, F. H., Jr., Late Local Recurrent Carcinoma of the Breast: Ann. Surg., 148: 192-196, August 1958)

* * * * * *

Health and Safety in Transportation

The assurance of health and safety in transportation has become one of the basic needs in modern life. In certain areas of the world, safety in transit is assuming even greater importance than problems relating to food, shelter, and clothing. In the United States, for example, extensive mechanization of the environment, diverse industrial procedures, and increasing use of transport vehicles have resulted in new threats to the well-being of large sections of the population.

Current approaches to the control of accidents may possibly be reaching the limits of their effectiveness. The next significant advances in safety may result from a combined approach which includes the engineering and biological sciences. This collaboration is not new in medicine and such an approach has been the basis of many important developments. In 1956, buses, automobiles, taxis, and trucks, operated by 77 million licensed drivers,

traveled some 630 billion miles on the highways in the United States. Drivers and passengers in automobiles and taxis alone accounted for 970 billion passenger-miles of travel; 51-1/2 billion passenger-miles were recorded in intercity bus operations.

In aviation, the volume and speed of travel have been increasing very rapidly. During the first 24 years of the air transportation industry, that is up to 1950, 100 million revenue passengers were carried by scheduled domestic and international carriers in the United States. By 1957, 349 million revenue passengers had been carried. The number of revenue passengers on airlines of the United States in 1956 was about 46 million. These represented about 70% of the total world volume of 68 million revenue passengers on airlines. In 1956, for the first time more passengers were carried to Europe by air than by ocean liner, and 68% of all passenger traffic between the United States and other nations was by air. Helicopter scheduled airlines were nonexistent 5 years ago. In 1957, this new type of service carried 152,000 passengers.

The frequency of accidents now presents a major problem. Each year approximately 95,000 persons are killed in various kinds of accidents in the United States. About 350,000 others receive permanently disabling injuries, temporary disabilities severe enough to keep them away from work for at least a day are incurred by 9-1/2 million persons. These accidents occur mainly in the home, on the job, and during transit. Accidents in various forms of transportation, particularly on the highway, have reached epidemic proportions. Since the invention of the automobile there have been more than a million fatalities in motor vehicle accidents in the United States; in 1957, highway accidents accounted for 41% of all accidental deaths. The annual direct costs of traffic accidents approximate 2% of the national income. Fatal accidents involving persons under 35 years of age formed a large proportion of the total deaths in highway accidents.

In the armed services, accidental trauma is now a major problem. During World War II, the U. S. Army reported more deaths among its soldiers caused by accidents than by disease for the first time in its history. In the Korean conflict, more than half of the hospitalized casualties resulted from accidents rather than from enemy action. Of these, 70% were incurred in motor vehicle accidents. The frequency of motor vehicle accidents in all three branches of the Armed Forces has become very serious, and accidents now exceed upper respiratory infections and rank first as the leading cause of man-days lost. Motor vehicle accidents account for about 2100 fatalities of servicemen each year, a large majority occurring while personnel are off duty.

The integration of motor vehicles into our way of life has become very costly in fatalities, injuries, and damaged equipment. In spite of the enormous increase in volume of highway traffic, there has been a significant decrease in accident rates during the past 25 years. In 1957, the fatality rate per 100 million miles of travel was only 5.9 in comparison with the rate

of approximately 15 about 20 years ago. Nevertheless, the actual number of persons killed or disabled and resulting costs to the Nation's economy have increased from year to year with only a few exceptions apart from the period of restricted travel during World War II. In 1957, there were approximately 38,500 deaths and 1,350,000 injuries disabling beyond the day of the accident. According to present trends, it is estimated that 1 of every 10 persons in the country will be injured or killed in a traffic accident during the next 15 years.

The safety record of scheduled airlines in the United States is an enviable one in relation to the exposure. Only 154 fatalities were reported for 1956, with the 128 deaths in the Grand Canyon accident accounting for approximately five-sixths of the total. In 1957, there were 31 deaths. Business flying is reasonably safe, but private flying has a relatively poor record. There were 655 fatalities in 1956 in 3411 accidents among 65,000 business and private planes. Thus, 1 in about every 19 of these airplanes was involved in an accident. Crop dusting by airplanes—of great importance to both public health and agriculture—is also hazardous. Military flying obviously involves increased hazards. However, in United States naval aviation, there is now only about one fatality per day.

Results of a number of studies clearly indicate that in relation to their numbers drivers up to the age of about 25 have accidents more frequently than do those from 30 through 60 or 65 years of age. The most recent and complete information, from Massachusetts and Connecticut, indicates the highest rates for the youngest drivers, those of age 16. The rate decreases with succeeding years of age, rapidly at first and then more slowly. It levels off at about age 30 and remains stable and relatively low through age 65. Data related to ages above 65 are as yet too meager for interpretation. The factors responsible for the higher rates for youthful drivers are believed related to inexperience and to psychological characteristics of youth in the adolescent and early adult phases of adjustment.

Of the greatest importance in driving safety are the attitudes and personal adjustments of drivers. A useful concept which has been developed in this area is that "a man drives as he lives." Studies of accident repeaters and accident-free drivers carried out in Canada showed that maladjustments in meeting the personal and social demands of living were far more frequent among the accident repeaters than among accident-free groups.

A large sample of truck drivers was evaluated in a study at Harvard University. Accident-repeater and accident-free drivers were carefully matched to meet rigid standards and various public records were searched for their names. Findings very similar to those in the Canadian study were obtained.

In another study, information from the service records of 210 military pilots who had been killed in noncombat aircraft accidents was compared with records of a 20% sample of reserve pilots discharged after satisfactory service

(personal communication). A record of disciplinary charges was found for 48% of the fatal accident group as against 31% of the control group. "Violation of flying orders" was the most discriminative type of offense—21% of the fatal accident group as against only 2% of the controls. Nonflying disciplinary infractions were also significantly different in the two groups, the accident group rating higher in resistance to order and discipline.

In situations involving time stress and complex reactions, the lower accident rate for adult and middle-aged drivers is clear, but for persons past middle age there is some evidence that the rate may increase. It is known that reaction times tend to become longer with advancing age, and impairment in the efficiency of all senses occurs. Many persons, however, develop compensating habits offsetting these losses. It is believed that older drivers tend to drive slower and to do less driving at night.

Many accidents occur when the efficiency of the driver is impaired by some temporary condition. The efficiency and safety of driving may be adversely influenced by a variety of temporary states, although in general, statistical proof of the importance of a given type of condition may be very difficult to obtain. The role of fatigue in asleep-at-the-wheel accidents appears quite clear, but fatigue may be a more subtle factor in many other accidents.

Driver fatigue is not only related to the length of time spent in driving. Consideration must also be given to such factors as amount and quality of previous rest, the nature of activities prior to driving, and concurrent emotional stress. In addition to the subtle disorganization of skill which develops with increasing fatigue, drivers when extremely tired may experience hallucinations of obstacles on the highway; a number of accidents have been traced to actions taken by drivers to avoid collision with these imagined barriers.

Driving skill is adversely influenced in many with as little alcohol in the blood as 0.03 and 0.04%. The likelihood of an accident increases constantly as the alcohol in the blood increases from the lowest levels. The risk at 0.10% is estimated to be more than twice that at 0.05%, while the risk at 0.15% appears about tenfold. In several series of autopsies recently made on drivers killed in accidents in the United States, significant amounts of alcohol were found in the blood and brain fluids of more than half of the cases.

Most authorities would agree that epileptics, diabetics requiring insulin, and those with certain heart conditions should not operate public highway conveyances or pilot airliners because of the hazard of a sudden loss of consciousness. But what of the influence of such conditions in the general driving public and what cutoff points should be kept in mind? There are, for example, about 6 million truck drivers in the United States, yet it is known that only a small proportion of them receive thorough physical examinations and that the development of adequate medical programs for the large number of workers in the transport industry remains to be accomplished. It would be expected

that in this occupational group a certain number use insulin, experience temporary impairments of consciousness, or have fairly advanced heart disease of one form or another.

The need for research to evaluate the influence of specific conditions in traffic accidents and to establish critical cutoff points is very great; physicians obviously can make important contributions in this regard. The limitation on driving for persons with various illnesses or disabilities presents a serious problem. An arbitrary prohibition of driving for all those afflicted with certain conditions would be needlessly restrictive and unfair to many persons, and cooperation between the medical profession and the motor vehicle authorities in handling these problems on an individual basis is essential.

In the field of air transportation, airline pilots receive periodic physical examinations through designated medical examiners of the Civil Aeronautics Administration. A few of the 80 airlines of the world have good medical departments, but less than one-fifth of the scheduled airlines have formal medical organizations. The report that each month for a 5-month period in 1957, a pilot on active duty died while in the cockpit will emphasize the importance of continuing medical supervision as well as of the value of having a co-pilot. One of the pressing problems in this area relates to the changing age distribution of airline pilots. With many of these men now entering age groups beyond 45 and 50, many problems of health and safety may be anticipated.

Many factors in the environment may influence the efficiency and safety of the operators of vehicles. Illumination, bad weather, and toxic agents, such as carbon monoxide, are important in highway safety, while temperature and humidity, and ventilation are significant under extreme conditions. Noise and vibration are known to be excessive in certain types of highway vehicles. In aviation, the development of the pressurized cabin is of special interest because it affords an unusual illustration of the relationships between the host, the agent, and environmental factors affecting both health and safety.

A significant factor in host-environment relationships is efficiency of vision. In the United States, accident rates per unit of travel are three times higher at night than during the day. Presumably, this is due partly to the lowered visilibity provided by night-time illumination, a contention supported by lower accident rates on lighted highways and by the reduction in rates following improvement of illumination on particular highways.

It has been calculated that for a dim light or object to be seen by an eye in the dark, the illumination must be doubled for every increase of 13 years of age. The use of tinted windshields by older drivers may present special hazards at night because the glass further reduces visibility by reducing the intensity of light reaching the eye.

The accepted function of medicine has been the treatment of disease and injury. Just as the province of medicine has been extended to include the prevention of disease, it is proposed that the prevention of accidental trauma should be a responsibility of preventive medicine and public health.

When accidental trauma is considered a noncontagious mass disease of epidemic proportions, the epidemiological approach should be applied to the study and control of injuries because similar biological principles are involved. An interdisciplinary approach is a basic requirement in this because multiple causation is found in most accidents.

The causes of accidents may be identified in the interactions between the host, the agent (or equipment), and variables of the environment. Human factors are especially important and the physician can contribute effectively in the analysis of accident causes because of his background in the biological sciences and his knowledge of human behavior. He can indoctrinate his patients and teach while treating.

Factors of significance to the host in the control of accidental trauma include not only those which determine suitability for a given task, such as driving a vehicle or piloting a plane, but also such factors as age, training, and particularly, personal adjustments.

The control of various temporary host factors, such as fatigue, emotional problems, effects of alcohol, and the influence of disease is highly important. Periodic medical examinations and adequate programs of health maintenance can play a significant role in improving safety both in land and air transportation.

Biotechnology and human engineering should be applied to the design of equipment in order to achieve a closer integration between the operator and his equipment.

The agent of disease also is significant in modern transportation because insect vectors of disease might be transported in planes and other vehicles and because long journeys may now be completed within the incubation period of contagious diseases.

Host-environment relationships also have implications for safety in transportation because of the influence upon the individual of physical variables, such as the level of illumination, temperature and humidity, and exposure to carbon monoxide and other toxic agents. Data have been worked out for each of these variables outlining the zones of comfort and discomfort and the ranges where human performance is adversely influenced.

In air transportation, the low tension of oxygen at high altitudes and decrease in barometric pressure with altitude are significant not only for their influence on the performance of airmen, but also because of their implications for the safety of travel by air by persons who are physically unfit or who are afflicted with certain diseases or physical conditions. These same factors are of critical importance in the development of equipment to transport passengers at very high altitudes because of their significance in the case of a sudden loss of pressurization.

The physician or the public health officer has a direct responsibility for the prevention of accidental trauma. He may contribute most effectively by his aid in carrying out controlled experimental and clinical studies, epidemiological surveys, and by collaborating with specialists in other biological sciences, with engineers, and administrative officers in a combined approach to this problem. (McFarland, R. A., Ph. D., Health and Safety in Transportation: Pub. Health Rep., 73: 663-679, August 1958)

* * * * * *

Changes in Threshold Limit Values

The threshold limit values contained in BuMed Instruction 6260. 5, Change 2, were taken from values adopted at the 19th Annual Meeting of the American Conference of Governmental Industrial Hygienists in April 1957.

During the 20th Annual Meeting of this Conference, 19 - 22 April 1958, the following changes to the 1957 list were made:

1. HETP (Hexaethyl tetraphosphate) was removed from the list.

2. The value for mesityl oxide was reduced from 50 p. p. m. to 25 p. p. m.

3.

New substances added	Parts per million	Milligrams per cubic meter
Phosphoric acid		1
Trichloropropane	50	300
sec-Hexyl acetate	100	590
Triorthocresyl phosphate		0.1
n-Propyl nitrate	25	110
Epichlorohydrin	25	90
1-1 dimethylhydrazine	0.5	1
Chlorine dioxide	0.1	

These changes will be reflected in Change 3 to BuMed Instruction 6260. 5, Threshold Limit Values for Toxic Materials, which will be promulgated in about two months. (OccHealthEngBranch, OccMedDispDiv, BuMed)

* * * * * *

Industrial Medicine

Industrial health is a specialized combination of medical and public health practices, uniting all relevant disciplines with the dual object of improving the worker's physical and mental efficiency and increasing production.

As industry has come to realize the value of keeping workers healthy, industrial medical programs have expanded rapidly. The physical examination is the keystone of the preventive medical program. The earliest preemployment examinations were intended primarily to discover existing physical defects so that they might not be alleged to have occurred in the course of employment. These are now known as preplacement examinations. They are designed to insure the assignment of workers to jobs that are commensurate with their physical and mental capacities. Periodic and transfer examinations are also regular parts of the health maintenance program. Special examinations are made on individuals exposed to known hazards or to those persons whose jobs involve the safety of other workers.

The objectives of occupational health are achieved through the cooperation of industrial medicine, industrial hygiene, safety, and engineering. Unlike other specialties, the industrial medicine specialty is a broad one. The industrial physician needs a working knowledge of chemistry, engineering, psychology, and business administration. A proper placement examination cannot be made unless he is familiar with the job, its physical demands, and its inherent hazards as well as the physical capacities and limitations of the employees.

Work carried on in industrial toxicology laboratories adds to the knowledge of the action of diseases on the human body. Basic research provides newer information on the subtler functional changes and a basis for earlier and more reliable diagnostic procedures. Techniques developed to study the mechanism by which a substance exerts its deleterious biologic action often can be utilized in the study of other diseases.

As more and more new compounds flow from the research and development laboratories to the production line, the need for toxicologic research grows correspondingly more urgent. Not only is it necessary for the industrial physician to know the effects that toxic substances may have on workers but the welfare of the consumers must be considered as well. Where harmful properties are inherent in a product, it is the responsibility of the manufacturer to set up codes for its safe handling and use by the public.

Industrial medicine encompasses all medical and public practices and depends upon cooperation between the industrial physician and the private practitioner to achieve its primary objective—the maintenance of a healthy efficient work force. This objective is accomplished through physical evaluation, health maintenance, medical and surgical care, industrial hygiene, and research. (Walmer, C. R., Industrial Medicine - The Newest Specialty: Penna. Med. J., 61: 748-751, June 1958) (OccMedDispDiv, BuMed)

* * * * * *

Letters from General Pate and General Hays

"27 August 1958

My dear Admiral Hogan:

It is my privilege to extend heartiest congratulations and best wishes from the United States Marine Corps to you and to the other members of the Navy Medical Corps upon the occasion of the 116th anniversary of the founding of your splendid organization.

The record of the Navy Medical Corps throughout the years is a most distinguished one, and an inspiration to all Americans. It is a record of high personal courage, dedicated service to humanity, unselfish devotion to duty, and outstanding professional competence. We Marines cherish the strong bonds of friendship which have developed through the years between the Navy Medical Corps and our own Corps.

With warmest personal regards and every good wish for the continued success of your Corps for many more anniversaries to come, I remain

Sincerely yours,

/s/

R. McC. PATE
General, U. S. Marine Corps
Commandant of the Marine Corps

Rear Admiral Bartholomew W. Hogan, (MC) USN
Chief, Bureau of Medicine and Surgery
Department of the Navy
Washington 25, D. C."

"Rear Admiral B. W. Hogan, USN
Surgeon General
Department of the Navy
Washington 25, D. C.

Dear Admiral Hogan:

The entire Army Medical Service joins me in extending congratulations to each member of the Bureau of Medicine and Surgery as you celebrate your 116th anniversary on 31 August.

We in the Army Medical Service are fortunate in being associated with an organization which has so distinguished itself, and we look forward with pleasure to continued cooperation with the Bureau of Medicine and Surgery.

My sincere best wishes for your continued success.

Sincerely,

/s/

S. B. HAYS
Major General
The Surgeon General"

* * * * * *

From the Note Book

1. Rear Admiral R. W. Malone DC USN, Assistant Chief for Dentistry, and Chief, Dental Division, Bureau of Medicine and Surgery attended the Forty-Sixth Annual Meeting of the International Dental Federation held in Brussels, Belgium, August 27 to September 2, 1958. (TIO, BuMed)

2. Captain J. J. Engelfried MSC USN represented the Navy Medical Department and the Department of Defense at the Seventh Congress, International Society of Blood Transfusion held in Rome, Italy, September 3 - 6, 1958. (TIO, BuMed)

3. CDR Margaret S. Lincicome MSC USN, Instructor of Parasitology, Medical Research Institute, National Naval Medical Center, participated in the Sixth International Congress on Tropical Medicine and Malaria held in Lisbon, Portugal, September 5 - 8, 1958. (TIO, BuMed)

4. Captains W. W. Ayres MC USN, V. G. Colvin MC USN, and T. M. Foley MC USN were placed on the retired list of Naval officers on 1 September 1958. (TIO, BuMed)

5. This study discusses the value of angiocardiography as an aid in the early diagnosis and prognosis of bronchogenic carcinoma. This technique is of particular value for the peripheral lesion where other findings may be inconclusive. (Am. J. Med. Sci., August 1958; H. A. Lyons, M. D., F. Vertova, M. D.)

6. In a review of 238 cases of gastrojejunal ulcer the diagnostic problems of the radiologist are stressed. Suggestions are made concerning radiological technique and the common and important diagnostic problems are discussed. (Radiology, August 1958; K. Ellis, M. D.)

7. This article reports 9 cases of tuberculous lymphadenitis treated with trypsin in sesame oil and uninterrupted antituberculous drugs. Follow-up periods varied from 8 to 16 months, including histopathological evaluation of the results of treatment. (Dis. Chest, August 1958; C. Rapoport, M. D., Israel)

8. Clinical and hematologic findings are presented in 18 cases of agranulocytosis which followed treatment with chlorpromazine. Granulocytopenia was of gradual onset and followed prolonged treatment with large cumulative doses of chlorpromazine. (Am. J. Med., August 1958; A. V. Pisciotta, M. D. et al.)

9. This study presents observations on the antigenic potency of poliomyelitis vaccine (Salk type) as measured by serologic tests on serum of vaccinated children and on the safety of vaccine used for this study. (J. Dis. Chil., August 1958; K. Sunada, M. D., et al.)

10. This article describes an improved device which has been used successfully for the prevention of injuries in the region of the face and head in contact sports. (Dental Digest, August 1958; J. F. Cathcart, D. D. S.)

11. The diagnostic value of biopsy of nonpalpable scalene lymph nodes in chest diseases is discussed. (Ann. Surg., August 1958; T. W. Shields, M. D., W. M. Lees, M. D., R. T. Fox, M. D.)

12. The proper selection of cases for heart surgery is discussed. (Postgrad. Med., August 1958; H. Swan, S. G. Blount, Jr.)

* * * * * *

Voluntary Retirement

Retirement after 20 or more years of service has been authorized since 1955, and a number of Medical Department officers have been granted this early retirement. It is felt that the availability of early retirement is a distinct addition to the attractiveness of a Navy career.

While general information on voluntary retirement appears to be widely distributed, letters and comments received indicate that some of the details are less widely known. The specific criteria prescribed by the Secretary of the Navy as meriting favorable consideration for early retirement are stated in SecNav Instruction 1811.3A of 10 September 1955, and anyone thinking of making such a request should be fully acquainted with this instruction as well as BuPers Instruction 1811.1A of 19 July 1957.

Among the six criteria listed is that of five years' service in grade for captains as well as 20 years' total service. Other of the listed criteria may be applicable to individual cases. Requests are considered on a basis of the over all needs of the Service and the merits of the individual case.

Requests should be submitted at least three months and not more than six months ahead of the desired date, and the preretirement physical must be reported to the Chief of Naval Personnel from one to three months in advance. BuPers requires that officers starting a new tour of duty complete at least one year at the new station before voluntary retirement is effected.

Obviously, an unexpected request for retirement creates problems in connection with a relief, and in some instances insufficient time has been allowed in which to arrange for a relief. Consequently, it is most desirable that BuMed be informed of prospective retirement plans as far as possible in advance of the prescribed three months lead time to insure that the desired retirement date can be met.

The Bureau is in no sense urging officers to consider early retirement. This note is simply to urge those who may be thinking of early retirement to become familiar with the requirements and proper procedure as detailed in SecNav and BuPers Instructions. (PersDiv, BuMed)

* * * * * *

Board Certifications

American Board of Internal Medicine

LT Robert E. DeForest MC USN
LCDR Max E. Musgrave MC USN
CAPT James L. Spencer MC USN

American Board of Neurological Surgery

LCDR Ernest J. Penka MC USN

American Board of Obstetrics and Gynecology

LCDR Robert C. Drips MC USN
CDR Halvdan G. K. Fasland MC USN
LT Mable A. Frew MC USN

American Board of Preventive Medicine (Occupational Medicine)

CAPT David H. Hersh MC USN

American Board of Ophthalmology

LT Harold D. Esterly, Jr. MC USN
CDR James I. Thorn MC USN

American Board of Pathology

LT G. E. Aponte MC USNR (Active)
CAPT William W. Ayres MC USN
LT William E. Cowell MC USN
CDR Robert M. Dimmette MC USN
CDR David B. Rulon MC USN

American Board of Radiology

LT Paul W. Mathews, Jr. MC USNR (Active)
LT William R. Nicolay MC USNR (Active)
LT Matthew F. J. Yenney, Jr. MC USN

American Board of Surgery

LT Claude H. Organ MC USNR (Active)

* * * * * *

Recent Research Reports

Naval Medical Research Institute, NNMC, Bethesda, Md.

1. Effect of Total-Body X-Radiation from Near Threshold to Tissue-Lethal Doses on the Small Bowel Epithelium of the Rat. I. Changes in Morphology and Rate of Cell Division in Relation to Time and Dose. NM 62 02 00.02.01, 23 January 1958. II. Changes in Nucleic Acid and Protein Synthesis in Relation to Cell Division. NM 62 02 00.02.02, 24 January 1958.
2. Prevention of Heat Casualties. NM 41 01 00.01.01, 21 March 1958.
3. Studies on Experimental Shigellosis. II. The Effect of Fasting and Fatigue on S. Flexneri 3 Infections in Mice. NM 52 04 00.01.03, 21 March 1958.
4. An In Vivo Change of Serological Specificity in Shigella Flexneri 3. NM 52 04 00 .01.04, 21 March 1958.

5. Ethylene Oxide Sterilized Freeze-Dried Dura Mater for the Repair of Pachymeningeal Defects. 70 01 00.01.01, 3 April 1958.
6. The Acetylcholinesterase Surface. IX. Dependence of Competitive Inhibition by Diaminocyclohexane Derivatives on Substrate Level. NM 02 02 00 .01.06, 14 April 1958.
7. Susceptibility and Resistance of Avian and Mosquito Hosts to Strains of Plasmodium Relictum Isolated from Pigeons. NM 52 01 00.02.01, 15 April 1958.
8. Serologic Reactions in Schistosoma Mansoni Infections. IV. Comparative Ionographic Study of Sera of Hamsters, Mice, and Albino Rats. NM 52 02 00 .01.02, 18 April 1958.
9. Effect of Carbohydrate Refining on Body Weight and Dental Caries in the Rat. NM 75 01 00.03.01, 25 April 1958.
10. The Roles of Endocrine and Behavioral Factors in the Growth of Mammalian Populations. Lecture and Review Series, No. 58-1, 22 May 1958.

Naval Air Development Center, Johnsville, Pa.

1. Effect of Simulated Catapult Launching on Pilot Performance. Report No. 1, NM 11 02 12.2, 31 December 1957.
2. Behavioral Effects of Whole Body Vibration. Report No. 1, NM 18 01 12.4, 28 January 1958.
3. Air-to-Air Tracking during Closed-Loop Centrifuge Operation. Report No. 1, NM 18 01 12.1, 10 March 1958.
4. Effect of Hypoxia on Tolerance to Positive Acceleration. Report No. 1, NM 11 02 12.3, 12 March 1958.
5. Erythrocyte Hydration under Positive Acceleration. Report No. 1, NM 19 02 12.1, 7 April 1958.
6. Variation in Duration of Oculogyral Illusions as a Function of the Radius of Turn. Report No. 2, NM 18 01 12.2, 22 May 1958.
7. Effects of Positive Acceleration upon the Performance of an Air-to-Air Tracking Task. Report No. 2, NM 18 01 12.1, 2 June 1958.
8. The Relationship between Pain and Tissue Damage due to Thermal Radiation. Report No. 15, NM 19 01 12.1, 11 June 1958.

Naval School of Aviation Medicine, NAS, Pensacola, Fla.

1. The Sentence-Completion Test as a Measure of Morale. Report No. 4, Subtask No. 4, NM 16 01 11, 12 March 1958.
2. Note on Relation of Age to Attrition. Report No. 25, Subtask No. 1, NM 14 02 11, 15 April 1958.
3. Evaluation of Certain Visual and Related Tests: I. Auditory and Visual Span. Report No. 1, Subtask No. 6, NM 14 01 11, 18 April 1958.

DENTAL SECTION

Facilities and Materiel Programs

Projects for new construction, expansion, or major alterations of dental facilities were completed at thirty-one shore based activities during Fiscal Year 1958. The majority of these projects provided for an increase in the total number of dental operating rooms available which will result in increased operating efficiency. Dental prosthetic laboratories were authorized at fourteen activities bringing the total of authorized prosthetic facilities to one hundred and sixty-five. Four dental activities with prosthetic facilities were decommissioned during the year.

* * * * * *

High-Speed Dental Radiographic Film

Attention is invited to a higher speed dental radiographic film which was recently added to the Armed Services Medical Stock List. The film's high speed emulsion permits reduction of exposures from one-third to one-quarter the time required for intermediate speed film and, therefore, minimizes the radiation hazard to patients and operating personnel. The life of x-ray tube heads is also prolonged. Nomenclature for procurement is:

FSN 6525-663-1558 - Film, Dental Radiographic, 1-1/4 inches, 150's: Single film packets, dispenser type package. Speed group 2.0; suitable for use in long cone techniques.

This item supplements FSN 6525-601-5010, Film, Dental Radiographic, 1-1/4 by 1-5/8 inches, 144's. It is suggested that the high speed dental radiographic film be used in lieu of the intermediate speed film to the fullest extent possible.

* * * * * *

Induction and Separation Examinations

Instruction 6120.4A provides current instructions regarding induction dental examinations as described in Article 6-52, Manual of the Medical Department, and modifies procedures for separation dental examinations.

RESERVE SECTION

New Component in Selected Reserve Forces

A new component has been established within the Selected Reserve Forces of the Naval Reserve—the Active Fleet Augmentation Component (Surface and Submarine).

The component is made up of all currently authorized Surface, Submarine, Electronics, and Fleet Divisions and their supporting battalion and brigade staffs. It will also include Training Divisions when established.

Reservists in this component will be trained to fill billets in active Fleet ships. As currently practiced, rate training, supplemented by team training and active duty for training (AcDuTra), will fulfill training requirements. Thus, there will be no drastic changes in the training program.

Personnel assigned to the new component will be those needed immediately at the outbreak of hostilities involving the United States. Reservists taking part in the program will constitute, in effect, an existing component of the wartime active Fleet because they will be preprocessed, preordered, and immediately available for combat duty. Because of their degree of readiness, it will not be necessary to order them to active duty until there is a specific need. They will not be ordered to active duty for such purposes as manning the Reserve Fleet or augmentation of the shore establishment in the event of partial mobilization.

Reservists in attached and associate status will be issued precut mobilization orders to report to their training centers for routing to their ultimate duty stations in the Fleet or as may be directed by the district commandants.

Those in associate pay status will be issued mobilization assignments in accordance with their individual qualifications. Those who are fully qualified will be assigned to the Fleet as part of the Active Fleet Augmentation Component (Surface and Submarine). Others who are qualified for active duty, but who do not meet all requirements for assignment to the Fleet, may be utilized initially to augment support personnel at training centers until mobilization processes have been completed. Once this phase is completed, these Reservists will be assigned to other billets.

The basic organization of the programs included in the new component will remain unchanged and there will be no phased transition period.

(The Naval Reservist, July 1958)

* * * * * *

Informative Publications

Any inactive Medical Department Reservist may obtain gratis a copy of the following informative pamphlets upon request to his District Commandant (District Medical Officer).

Navy Reserve Medical Department Program. Developed by the Reserve Division, Bureau of Medicine and Surgery, this printed booklet provides detailed information concerning the Naval Reserve Medical Department Program. It covers such subjects as training, pay, promotion, retirement, opportunities for undergraduate and graduate medical students, terminology, and pertinent references of the Naval Reserve, available free publications, and questions and answers concerning the individual's participation in the Naval Reserve. This pamphlet is a handy reference containing useful and valuable information for motivated MD Reservists.

Creditable Correspondence Courses for Inactive Reserve Medical Department Officers. This pamphlet lists creditable correspondence courses in three main areas of study: executive, operational, and technical with appropriate general and professional correspondence courses available to eligible inactive Reserve MD officers of all ranks. Also furnished are promotion point requirements and instructions for making application for enrollment in a particular course. This pamphlet is a must for the Reservist endeavoring to qualify for promotion to the next higher rank.

* * * * * *

PREVENTIVE MEDICINE SECTION

Influenza

The appearance of another antigenic variant of Type A influenza (Asian or Far East) in a relatively nonimmune world population in the spring of 1957 was followed by the expected widespread dissemination of the virus. Despite immediate recognition of the initial outbreaks of illness with isolation and identification of the offending agent, the tools were not at hand to prevent the disease from reaching pandemic proportions. Fortunately, the mildness and brevity of the disease and the infrequency of associated deaths

remained fairly constant as the initial wave swept from country to country. Exceptions in isolated circumstances were probably due to factors other than change in the virus. Even though increasing virulence of the virus, severity of the disease, or frequency of complications were not the problems, an illness affecting millions of persons throughout the world deserves critical examination with all facilities available. The experience of the past year amply demonstrated the inability of vaccine to restrict the spread of a new antigenic variant of influenza even in those countries prepared for rapid vaccine production. Barring the development of universal influenza A and B antigens, new methods for control, or therapy of viral infections, it becomes obvious that more information is needed on the immediate as well as the long-term effects of influenza, proper therapeutic measures, and the prevention of complications.

A better understanding of the mechanism of clinical features certainly is required. Whether initial infection occurs in the nasopharyngeal mucosa in man is not known, although symptoms are sometimes referable to this area. Effects have been noted in the mucosal lining of the tracheobronchial tree from uncomplicated influenza as well as associated deaths, and have consisted of areas of denudation and metaplasia with submucosal edema. The next step in disease mechanism is not clear. Clinical manifestations extend far beyond the respiratory tract and frequently are minimal in that area. Does the virus spread to other organs or is there a circulating toxin? The influenza virus particle itself has been shown to be toxic to laboratory animals, but a soluble toxin has not been associated with active infection. Viremia has not been described in influenza in man, but this could be the result of insufficient effort in this direction or to its occurrence prior to onset of symptoms. Multiplication of this virus in other tissues seems less likely than poliomyelitis. The latter has been propagated in most human tissues in culture, but growth of influenza virus has been demonstrated only in lung and kidney culture. It would certainly be valuable to know whether viral multiplication takes place in the kidneys or other areas of the intact host. Although delirium is associated with severe cases and postinfectious encephalitis occurs, virus has not been recovered from the central nervous system of man. The potentiality exists, nevertheless, because certain strains can be adapted to growth in the mouse brain. Similar questions arise regarding susceptibility of pericardial epithelium or vascular endothelium.

Reasons for variation in severity of the disease in persons in the same epidemic are not known. Measurable differences in virulence of strains isolated in an epidemic have not been found. Possibly, there is less viral multiplication or neutralization of tissue-damaging activity in some persons owing to antibody or nonspecific inhibitors or physical restriction of the disease to the initial site. The cause of the prolonged deep productive cough that sometimes continues after the acute phase of the illness has not been related to specific bacteria or preexisting pulmonary disease. Although this

could be the result of the degree of mucosal destruction, secondary bacterial infection amenable to therapeutic measures is a good possibility. The cause of the severe and prolonged asthenia following the acute phase of the illness is still unknown. If this were shown to be produced by an altered tissue or metabolite or deficit in a critical substance, the corrective measures might become obvious.

Perhaps more pressing is the acquisition of insight into complications, such as pneumonia, severe toxicity with hypotension, myocarditis, or precipitation of congestive heart failure. The fulminating nature of the bacterial pneumonia occasionally occurring in young adults or pregnant women and in persons in the extremes of life leaves little time for therapy and delay can result in a fatal outcome. Certainly, promiscuous prophylactic antibiotic administration is not the answer to this infrequent—although serious—problem. Moreover, the peripheral leukocyte count is of doubtful aid because it is sometimes elevated in uncomplicated influenza and frequently depressed in most pneumonia cases with fatal outcome. Precision in diagnosis of the causative agents involved in pneumonia deaths would be useful in outlining management. So-called sterile lungs from patients given antibiotics prior to death are of doubtful meaning in assessing the role of bacteria or the virus. The difficulty in cultivation of certain bacteria, such as Hemophilus influenzae; the significance of antibiotic-sensitive organisms cultured from the lungs of patients treated with the same antibiotics; the presence of bacteria in circumscribed areas and absence in others; the separation of contaminants from the pathogens; and the lack of quantitative measure of bacterial as well as viral infection are all problems in the way of elucidation of the etiology and mechanism of these pneumonias.

Therapy of severe toxicity with hypotension and cyanosis in patients with uncomplicated influenza or bacterial pneumonia provides an additional dilemma. The administration of adrenal cortocoids might tide the patient through this phase; on the other hand, the incidence of bacterial pneumonia could be increased or the degree of tissue damage enhanced. Possibly, positive-pressure respiration would be of some value, but more pulmonary function studies are needed in patients with heart disease or pneumonia complicating influenza. How strictly should bed rest be enforced and for how many days in order to avoid sudden death—presumably due to postinfluenza myocarditis—is another important consideration. What precautions should be taken by patients with heart disease, pregnancy, or other conditions prior to an epidemic or during their illness must be determined. These are all real problems that must be answered. In each instance, investigations of the disease mechanism are needed. Careful virologic and bacteriologic studies in conjunction with biopsy and autopsy material can be correlated with results of application of diagnostic and functional studies of all organs.

It is rather surprising that the influenza viruses—especially during the Asian strain pandemic—have not produced more virulent variants. Only a few

intranasal passages in mice are required for adaptation; pneumonia and death will then occur after infection Evidently the factors are different in man-to-man transfer, for there are countless human passages of the virus during a worldwide epidemic.

Many problems are still associated with influenza vaccines. They have been prepared in the allantoic sac of the embryonated egg and, consequently, cannot be administered to persons sensitive to egg protein. However, this is only a minor phase of the difficulties. The incidence of local and systemic reactions of a severe—although not dangerous—nature is considerable and can usually be correlated with the amount of virus in the vaccine. More information is needed on multiple small injections or the suitability of adjuvants; the best route of administration and temporal spacing of inoculations must be determined. Other methods of preparation of the vaccine should also be investigated. The techniques and production methods for poliomyelitis vaccine in monkey kidney cultures should be helpful in the preparation of influenza vaccine from such a system. Efficacy or protection are difficult questions to answer. Low levels of antibody might produce herd immunity that would suggest a high degree of protective effect by a given vaccine. This could be insufficient safety for the special risk patient with other conditions. Much information has been obtained on production of titratable antibodies after vaccination, but this is not the real test of the material. Methods of inactivation and purification also vary and may affect the immunogenicity of the virus. What the role of circulating antibody might be in a disease affecting respiratory epithelium and, presumably, without a viremic phase is another matter for conjecture. Might the illness be restricted to an afebrile respiratory disease? Would protection be complete? Would viral multiplication take place in the absence of any symptoms, but still allow spread of the agent?

Subsidence of the Asian influenza epidemic should not cause these problems to be placed in the background. The facility of influenza viruses for antigenic variation will again set the stage for pandemic illness. Also, there are still many persons with little immunity against the Asian and the Denver strains of influenza A, and the degree of reciprocal immunity with these two viruses is probably low. Antibody levels to influenza B have now fallen to the point that outbreaks or epidemics can be expected. Even though the obvious influenza-associated deaths due to Asian virus were low in incidence, over all mortality rates were clearly elevated by this illness. In nonepidemic years, it is difficult to determine the effect of such respiratory virus infections on death rates. Undoubtedly, the life expectancy of patients with chronic disease is frequently shortened by these illnesses and the results of many refinements in their management are accordingly nullified.

Extension of the above problems and results of the investigations of them can be made to other respiratory virus infections in many instances. Influenza can serve as a useful tool in this respect. Many of the features of adenovirus illness are similar to influenza and it is likely that complications

could be handled in the same fashion. Undoubtedly, a multivalent respiratory disease vaccine would be a great asset not only in removing discomfort and economic loss, but possibly in reducing degenerative disease. Whether complete recovery of bronchial mucosa occurs after infection, whether metaplasia remains and predisposes to anaplasia later in life, and whether permanent damage occurs in the cardiovascular or renal systems are all matters that should prevent physicians from being too philosophical about attacks of "the flu." (Mogabgab, W. J., Influenza: Arch. Int. Med., 101: 681-684, April 1958)

* * * * * *

Chest Roentgenogram and Related X-Ray Radiation Effects

The chest x-ray continues to be an important part of all tuberculosis casefinding programs and an important and dependable tool in early diagnosis of unsuspected chest disease.

In June of 1956, the National Academy of Sciences, National Research Council, called attention to the Biological Effects of Atomic Radiation, especially as it affects the human body and its reproductive organs. Later reports discussed the possibilities of effects of body radiation upon the blood system with leukemia as a delayed effect.

This discussion on radiation effects has led everyone—scientists, physicians, and laymen—to think deeply concerning them and to weigh the benefits from x-ray diagnostic procedures against the liability of harmful effects of radiation. Most factual information on this aspect of low doses of ionizing radiation has come from animal experimentation.

In people who are ill, the needs for radiological studies are great and the diagnostic benefits outweigh the possibly hazardous effects of radiation. All radiation exposure that serves no useful purpose should be scrupulously avoided.

That no standard pattern of radiation exposure is delivered by any standard type of x-ray machine is well recognized. Each x-ray unit must be provided with all necessary safety devices for minimizing gonadal and general body radiation. This must be done by persons trained in radiological protection.

Who Should Get X-Rays?

The American Trudeau Society has emphasized that chest roentgenograms are justified only if they lead to the detection of previously unsuspected or clinically significant, curable lung disease, followed with appropriate therapy. If abnormal chests are not followed up, radiation has been wasted. Therefore, it is essential for those engaged in the detection of pulmonary disease to evaluate their yields. Among certain population segments in which

there are high yields, periodic chest x-rays are the most practical approach. Among infants, children, young adults, prenatal patients, and especially young diabetics, the tuberculin test should be used as the preliminary screening technique whenever possible and the tuberculin reactors should have x-ray examinations of the lungs. However, aside from screening, every child should have a single x-ray film for the identification of congenital or developmental defects and nontuberculous disease and for comparison with any films taken later in life. Only those x-ray units that meet modern requirements for radiation protection should be used.

What Type of Apparatus Should be Used?

Other factors being equal, the amount of radiation necessary for a satisfactory chest film is least with a standard 14 x 17 film in a cassette with intensifying screens. In comparison, there is approximately 3 to 5 times more radiation using the mirror optics photofluoroscopic unit and about 10 to 20 times the radiation exposure when using the standard lens camera photofluorographic machine. This is still a very small amount of radiation, but these figures may be multiplied by 100 if the apparatus is not properly equipped with protective devices.

Where the number of survey films taken is small or when modern protective devices have not been installed, it is better to use standard 14 x 17 films, even at a higher cost. Where the number of films taken per day is large or the machine must be moved frequently, a properly equipped photofluorographic unit is the most practical apparatus. The increased amount of radiation involved is small and is warranted where the yield of new cases is significant.

Whenever a new photofluorographic unit is purchased, the newer mirror optical system camera is to be preferred over the ordinary lens system even at greater cost. Screening of groups by fluoroscopy should be discouraged because the results are not accurate enough for diagnostic purposes; there is no permanent film record of the examination and the radiation exposure involved is excessive.

The Nature of Radiation Effects

Populations are being exposed to a variety of radiations from natural and artificial backgrounds as well as from medical examinations. Exposure received by the population today from all sources appears to be at a lower level than that which has produced harmful effects in humans and experimental animals. Those responsible for screening programs should insure that the radiation dose is maintained at the lowest practicable level both to those being examined and to equipment operators.

Conclusions. The kernel of the problem of radiation effects is the awareness by the public, physicians, and tuberculosis workers that the whole subject is one of weighing the benefits of radiography against the known and unknown effects of radiation exposure. It should remain clear that radiation

which serves a useful and necessary purpose is warranted, but it should be used with the best protective devices. Putting the chest x-ray examination in its proper perspective, the radiation exposure to the gonads or body from a single chest film using a well monitored machine is infinitesimal when compared to the commonly used x-ray diagnostic procedures directly involving the gonadal areas.

Recommendations. Several specific recommendations from this report can be made to the constituent associations of the National Tuberculosis Association and American and State Trudeau Societies.

1. Chest x-ray surveys must be continued in the field of tuberculosis, in the detection of cancer, industrial thoracic disease, acute and chronic non-tuberculosis infections, chest tumors, and cardiovascular abnormalities.

2. Conventional and photofluorographic x-ray units with adequate protective devices may be used to survey segments of the population which are expected to show a high yield of thoracic disease.

The installment of certain protective devices should be made now. These include proper cones, proper filtering, shielding devices for subject and operator, and exposure controls of an automatic nature.

3. Tuberculin testing in infants, children, young adults, prenatals, and young diabetics should be developed as a primary guide to tuberculosis contacts and as one case-finding method, limiting x-ray of the chest to those with a positive tuberculin test.

4. Case-finding programs should be reassessed to determine those segments of the population most deserving of chest x-ray surveys or tuberbulin testing.

5. The instruction and training of personnel should include information concerning the protective devices for all types of x-ray units.

6. It should be made known to health workers and the public that effective steps have been taken to minimize radiation exposure involved in taking chest x-rays. The need for early diagnosis and treatment of all forms of pulmonary disease should be emphasized.

7. Members of the American Trudeau Society and constituent associations of the National Tuberculosis Association might well promote the training of personnel skilled in radiation protection. The leadership of these organizations in the field of thoracic disease would help to assure the public that radiation exposure is at a minimum and that protection is maximum wherever chest x-ray examinations are conducted under their sponsorship. (Executive Committee, American Trudeau Society, Chest Roentgenogram and Chest Roentgenographic Surveys Related to X-Ray Radiation Effects and Protection from Radiation Exposure: Am. Rev. Tuberc., February 1958; abstracted in Tuberculosis Abstracts, Nat. Tuberc. A., XXXI: 7, July 1958)

* * * * * *

WHAT YOU SHOULD KNOW ABOUT... USE OF TURN SIGNALS

TO make a safe turn in the old days a driver just put his arm out the window. But when his wife came up with electric gadgets that took "drudgery" out of housework and "dishwater" out of hands, he wanted something to take the arm out of signaling. To free him from the coarse red highway hand—auto makers came up with . . .

BRIGHT mechanical turn signal lamps. In the change-over, safe driving—in many instances—was short circuited. Some drivers now cruise along, their turn signals flashing, without any intention of turning. This makes the driver behind nervous. Turn signals should speak clearly—reassuringly. Here's the way.

KNOW THE LAW

Most states and cities have adopted turn signal laws in conformance with the Uniform Vehicle Code. The UVC lists these rules for turning:

- **GET IN POSTION**

  Don't turn unless you can do it with reasonable safety. That means you must look ahead, decide where you want to turn and be in a position to turn when you get there. This applies to intersections, traffic lanes, private roadways and driveways, and passing cars.

- **MAKE THE SIGNAL IN ADVANCE**

  Give a continuous signal for a distance of at least 100 feet before turning.

- **DON'T SURPRISE**

  Don't stop or suddenly decrease speed without giving an appropriate signal unless there's an emergency.

- **KEEP YOUR HANDS**

  There's no law against using your arm and hand to make a turn signal. But signal lamps are required when: the distance from top of steering post to the left outside limit of the vehicle body exceeds 24 inches; the distance from center of top of steering post to rear limit of vehicle body or load exceeds 14 feet.

- **YIELDING THE RIGHT-OF-WAY**

  Driver intending to turn left who is already within intersection should yield right-of-way to approaching vehicles within intersection or close enough to be a hazard. Having yielded right-of-way, driver may then turn and any approaching vehicles should yield right-of-way.

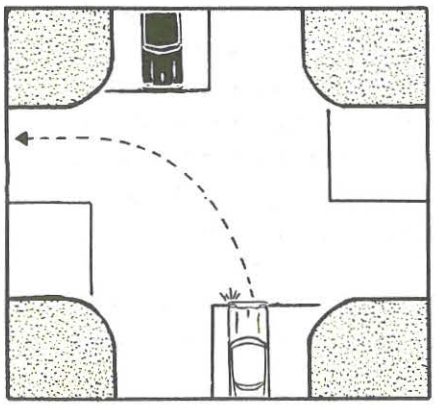
DRIVERS SHOULD ALSO:

- **Be alert for unexpected actions of other drivers.**
- **Make sure they don't behave unexpectedly themselves; flashing turn signals to change lanes is not enough—check traffic first.**
- **Check mechanical turn signals periodically to be sure they're working.**
- **Make certain turn signals are not flashing when there is no intent to turn.**

GOOD RULE AT INTERSECTIONS

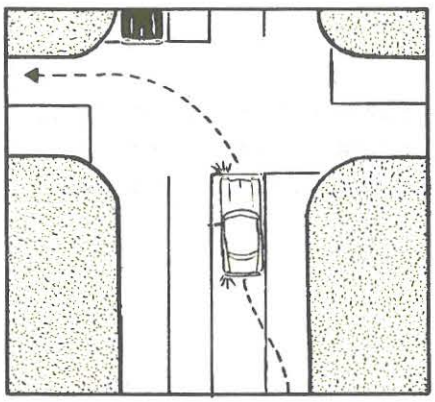
Any pedestrian or vehicle in, or about to enter, intersection has right-of-way over vehicle making the turn.

HOW TO MAKE LEFT TURN



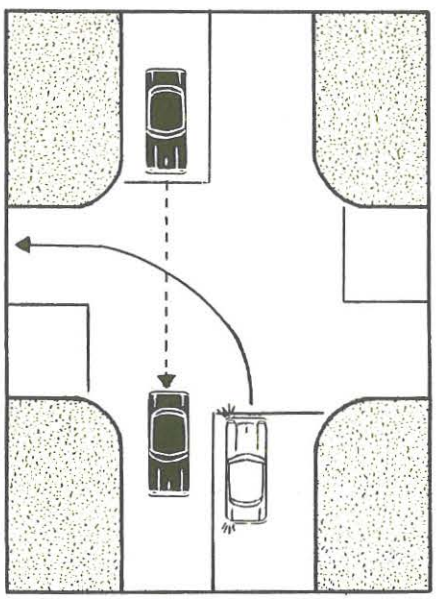
← ON TWO-LANE ROAD

Driver moves to extreme left of lane to make turn; thus he warns other motorists that he intends to turn left. At least 100 feet before turning he starts giving continuous turning signal and slows down.



← ON FOUR-LANE ROAD

Turn must be made from left lane; thus driver should plan transfer from traffic lane in advance of turn, making it with extreme care and signaling if necessary. At least 100 feet before turning he starts giving continuous turning signal and slows down.



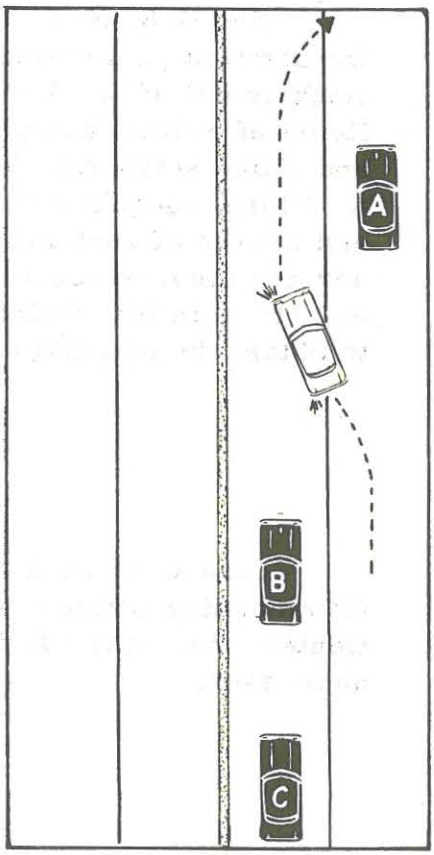
← TURNING

*Don't turn too soon. Driver must keep to right of center line at cross walk of street he is leaving.

*When driver leaves intersection after turning he should enter to right of center line of roadway.

*When possible the left turn should be made to the left of the center of intersection.

*Remember—any pedestrian or vehicle in or about to enter the intersection has right-of-way over vehicle making turn.



↑ WHEN PASSING

Cars A, B and C are traveling about 40 m.p.h. on a 4-lane divided highway with posted speed limit of 45 m.p.h. To pass A the driver should:

- Make sure there's enough roadway between B and A
- Then signal informing B and C he intends to pass A and will be in their lane.

FOR RIGHT TURN—observe same general rules, but keep as close to right as possible when approaching intersection and when turning.

(Traffic Safety, September 1958)

Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

* * * * * *

Change of Address

Please forward requests for change of address for the News Letter to: Commanding Officer, U. S. Naval Medical School, National Naval Medical Center, Bethesda 14, Md., giving full name, rank, corps, and old and new addresses.

* * * * * *

DEPARTMENT OF THE NAVY
U. S. NAVAL MEDICAL SCHOOL
NATIONAL NAVAL MEDICAL CENTER
BETHESDA 14, MARYLAND

OFFICIAL BUSINESS

Permit No. 1048

POSTAGE AND FEES PAID
NAVY DEPARTMENT